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from Cape Breton Island, Nova Scotia. But even in the interior, good material apparently is not lacking: fine specimens of *S. papillosum* have recently been received from Michigan. Except in regions where the climate is congenial, however, it is to be expected that sphagnum of surgical value will be very local in their distribution.

In conclusion, information is particularly sought regarding the occurrence in quantity of *S. papillosum*, since this species, as already pointed out, has proven the most uniformly adapted to surgical use. *S. papillosum*, to a limited degree, of course, can be recognized by its very robust habit and its commonly yellowish brown to brown pigmentation. Information regarding *S. palustre*, *S. imbricatum*, and *S. magellanicum*, where these appear sufficiently luxuriant to be of use, will also be welcome, but these, particularly the last named, tend to be of too poor quality (too much stem in proportion to foliage, stem too stiff, etc.) to meet the requirements.

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### NOTES ON *RADULA OBCONICA* SULL.

ANNIE LORENZ

There are but few references to this interesting species in American hepatic literature. Sullivant's original description, copied by Underwood in his catalog of North American Hepaticae, (7, p. 44) was in the 1848 edition of Gray's Manual (6, p. 688), but it was not there illustrated. The figures appeared in the second edition, 1856, drawn by Isaac Sprague. While they are very small, and lacking in critical detail, they give a good impression of *R. obconica*'s branching habit, and its general similarity to *R. complanata*. In fact, the two species are very closely related, the chief reason for separating them being the difference in their methods of vegetative reproduction.

The plant is of a more copiously branching and slender aspect than *R. complanata*, and it is found in moister situations than either that or *R. tenax*, on rocks in brooks, damp places near waterfalls, dripping rocks, etc. Sullivant gives its habitat as cedar trees, but Austin first notes its occurrence on rocks in his *exsiccatae*. In New England it usually occurs on rocks, being found upon both granitic and trap rocks.

As *R. obconica* has been but scantily described or figured, the following description has been compiled mainly from Sullivant and Stephani (4). The latter, of course, is not familiar with it in the field, so the writer has been obliged to differ with him on a few minor points. He says the species is heteroicous; it should be regarded rather as proterandrous, as the ♂ bracts are developed on the branch before the ♀ bracts. He gives the bracts as "hardly smaller than the stem-leaves"; the contrary is true of the New England material; also he makes no mention of the method of vegetative reproduction in either this or any other species of *Radula*. Müller, also, does not consider the method of vegetative reproduction as a specific diagnostic character.

Stevens (5), in 1910, studied the discoid gemmae in *R. complanata*, and Miss Williston (9), in 1912, discussed several species of *Radula*, all of which

have gemmae of the type which grow to a specific size and are then shed before germination commences.

'DESCRIPTION OF *Radula obconica*

*Kadula obconica* Sullivant. Gray's Manual, Ed. 1, 1848.

Delin. Gray's Manual, Ed. 2, 1856.

Exsic. Aust. Hep. Bor. Amer. no. 88.

Monoicous, small, dark olive-green, coloring-matter imparting a yellowish green tint to water, like other *Radulae*, rather stiff, growing upon damp rocks or bark. Stem about 1 cm. long, indefinitely pinnate-branching. Stem-leaves hardly imbricated, almost flat, conduplicate, nearly horizontally spreading, very ovate, 0.86 mm. long, 0.65 mm. wide, apex obtuse, free about halfway to base and covering the stem. Lobule small, subquadrate, 0.27 mm. long, 0.23 mm. wide, obliquely truncate at apex, with an obtuse or acute angle at base, entirely adnate, upper margin (parallel to the stem) 0.2 mm. long, keel obliquely spreading, slightly arched, 0.4 mm. long, with smooth sinus terminating at the margin of the leaf. Leaf-cells hexagonal, upper  $18\mu$  in diameter, basal a little longer, trigones almost none. Perichaetial bracts a little larger than the stem-leaves, spatulate, with rounded apex, lobule shorter, very similar, apex truncate. Perianth with innovations on each side, clavate-oblong, 2 mm. long, mouth repand, entire, shortly bilobed. Perigonal bracts hypogynous, bracts in few pairs, deeply saccate, upper lobe rather gradually rounded, the under lobe very shortly truncate. Vegetative reproduction by means of caducous brood-leaves producing leafy shoots.

HABITAT. Wet rocks, or tree trunks.

DISTRIBUTION. Somewhat more southerly than the common species, according to the material in the herbaria of Dr. Evans, the New York Botanical Garden and the writer. Stations are as follows:

Vermont: Llana Falls, Salisbury. (A. L.).

Massachusetts: Bare Rock Falls, Sheffield. (A. L.).

Connecticut: *Litchfield*: Watertown, (A. L.); *Fairfield*: Redding, (Evans); *New Haven*: Mt. Carmel, (Evans), Hamden, (Evans), New Haven, (Evans), North Branford, (Evans), Oxford, (Harger), Guilford, (A. L.); *Middlesex*: Killingworth, (Nichols); *New London*: North Stonington, (Evans).

Pennsylvania: Delaware Water Gap, (Garber).

New Jersey: "Rare," (Austin).

District of Columbia: Washington, (Holzinger); Georgetown, (Coville).

Virginia: Nicks Creek, (Mrs. Britton and Miss Vail).

North Carolina: Salem.

Georgia: Tallulah and Toccoa Falls, (Underwood and Seymour).

Ohio: Champaign County, (Miss Biddlecome); Columbus, (Sullivant).

Arkansas: Boston Mts., Swain, (W. H. Emig).

*R. obconica* produces caducous brood-leaves in precisely the manner described by the writer in 1912 in *Frullania* (2), except that rhizoids have not been observed on the shed leaves. These leaves are "Brüchblätter", and not "Brutblätter", as they do not break off at any particular place. Goebel (1, p. 674, f. 632) figures a *Radula* from Brazil which has similar leaves breaking off at a specific spot.

A marginal cell on the shed leaves of *R. obconica* darkens, enlarges, and the cell-wall thickens, though not as noticeably as in *Frullania*. This enlarged cell divides by a horizontal wall, forming an inner and an outer cell. The outer one divides by a wall perpendicular to the leaf-margin, these divide in turn, and one side cuts out a triangular apical cell. The shoot develops directly from this, its first leaves being rudimentary, but it soon forms regular leaves with lobules, and is then easily detached from the parent leaf.

The cell-masses are not produced in as great abundance as in *Frullania*, but were observed on perhaps half of the specimens studied. They occur upon ♂ bracts as well as upon the leaves; none were observed upon the lobules.

The habitat has no apparent effect upon the production of brood-leaves, for while all the New England material examined by the writer grew on rocks, some particularly fine specimens were found on Miss Biddlecome's Ohio plants growing upon *Juniperus*.

The accompanying figures are drawn mainly from material collected by Dr. Evans in Connecticut, and the writer would thank him for lending his material of *R. obconica* for these investigations.

HARTFORD, CONNECTICUT, MARCH, 1918.

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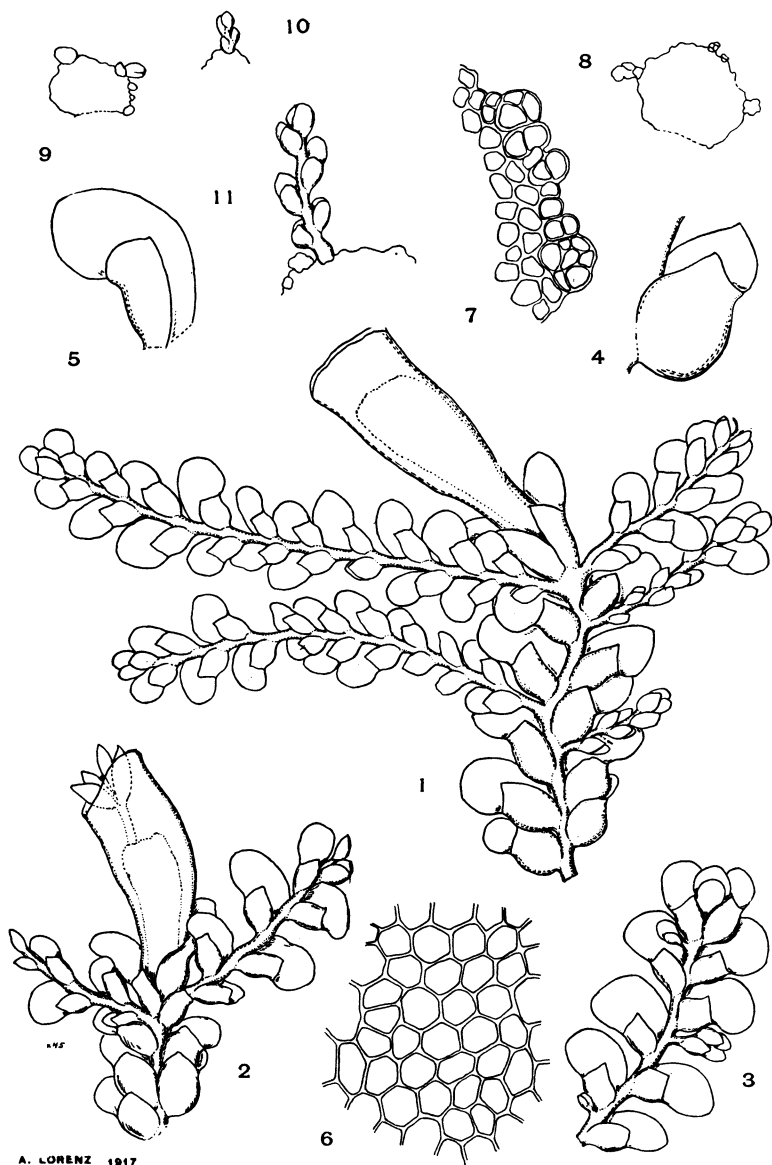
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#### PLATE XXV. EXPLANATION OF FIGURES

##### *Radula obconica* Sullivant

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| 1. Plant with perianth. $\times 22\frac{1}{2}$ . | 7. Marginal cells. $\times 285$ .                  |
| 2. Plant with perianth. $\times 22\frac{1}{2}$ . | 8. Leaf with cell-masses. $\times 43\frac{1}{2}$ . |
| 3. Sterile shoot. $\times 22\frac{1}{2}$ .       | 9. Leaf with cell-masses. $\times 43\frac{1}{2}$ . |
| 4. Sterile bract. $\times 43\frac{1}{2}$ .       | 10. Leafy shoot. $\times 43\frac{1}{2}$ .          |
| 5. Sterile bract. $\times 43\frac{1}{2}$ .       | 11. Leafy shoot. $\times 43\frac{1}{2}$ .          |
| 6. Leaf-cells. $\times 285$ .                    |  |

All figures drawn by the writer from material from Mt. Carmel. Branford and N. Stonington, Conn. (A. W. E.), and Mt. Washington, Mass. (A. L.).



*Radula obconica* Sullivan